title, name, block
purpose, hypothesis - include equations and book values, procedure "refer to lab manual p34"
observations, analysis - show calculation of c or H and % error - your value-book value/ book value
conclusion -
Sources of uncertainty - details and evidence

Radiation:

isotopes - atoms with the same number of protons but different number of neutrons.

some isotopes are unstable, so they can give off energy in the form of particles or photons (bundle of electromagnetic energy)

3 types of common natural nuclear radiation

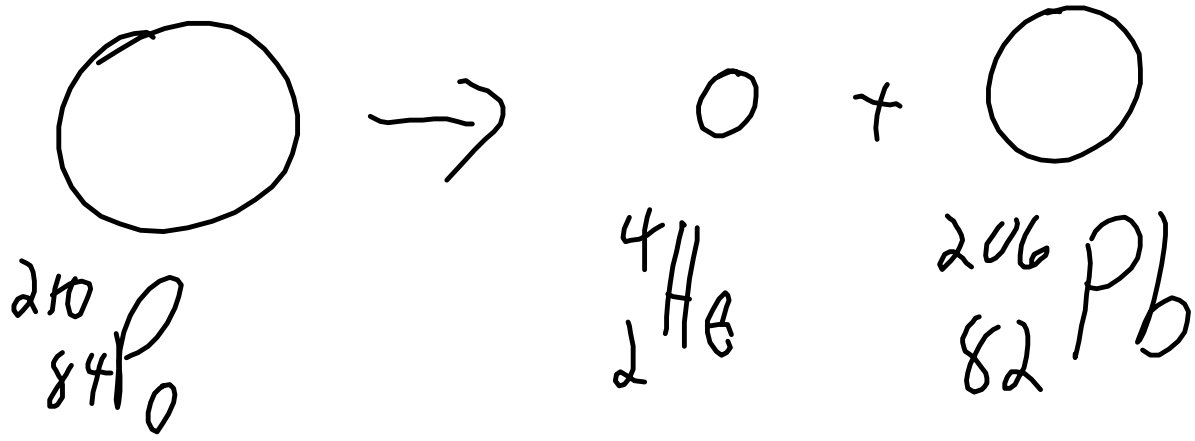
(most radiation comes from the electrons jumping energy states, nuclear radiation comes from the nucleus)

alpha, α, beta, β and gamma, γ

alpha particles are a helium 4 nucleus emitted

from the nucleus. Low penetration - blocked by a piece of paper, but lots of energy - toxic if eaten.

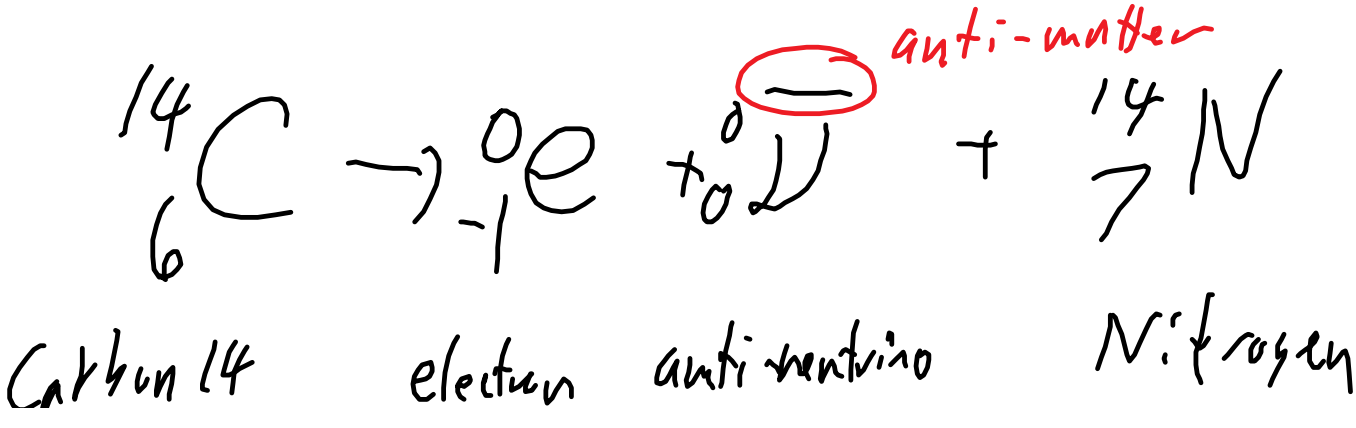
eg. Polonium 210 decays by alpha decay. What element is left after the decay?



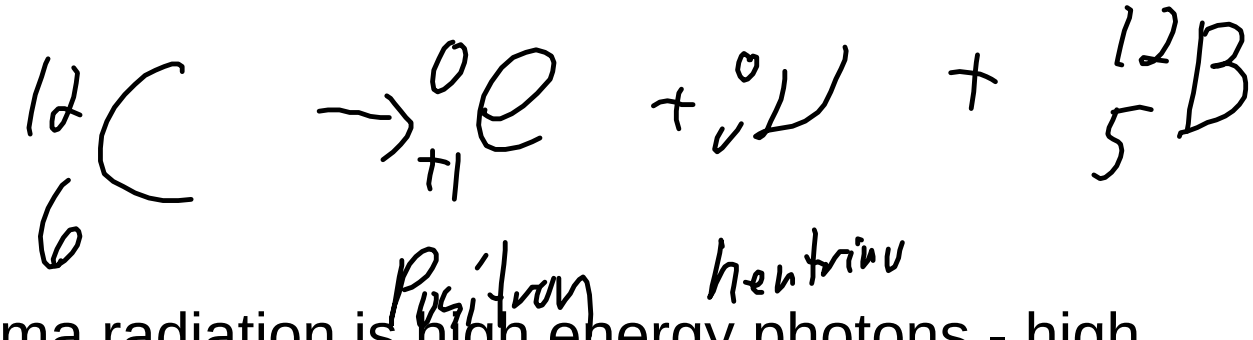
beta particles are two types, beta negative (common) and beta positive (rare)

beta negative is an electron and anti-matter neutrino emitted from the nucleus. medium penetration, blocked by thin lead sheet, though the neutrinos are not blocked by anything.

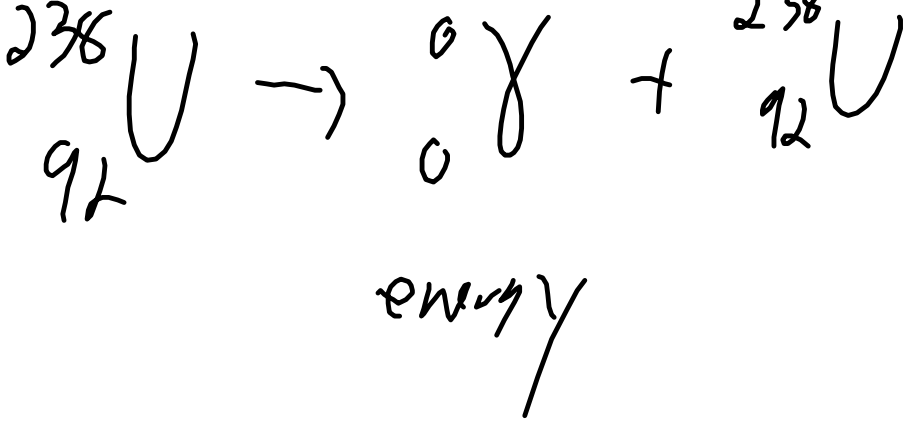
eg. Carbon 14 decays by beta negative decay to?
\



carbon 12 decays by beta positive decay, a positron (anti-matter electron) is emitted with a neutrino



gamma radiation is high energy photons - high frequency wave of electromagnetic energy. Doesn't change the nuclear mass number or atomic number. It does change the binding energy - next class.



Block 2-4
Lab and test corrections due next class

Lab report needs:

title, name, block
purpose, hypothesis - equations and book values you are testing
procedure - don't copy just write" refer to lab

manual p34"
observations - data table
analysis - calculations of c metals and H for ice
show your work, and show calculation of %error = (your value-book value)/book value x 100%
Conclusion - does the data support your hypothesis? how close?
sources of uncertainty: - reasons, evidence from data/observation

due next class -

Radiation:

Bananas have lots of potassium which has a radioactive isotope, potassium 40 that gives off high energy particles, beta particles.

Ionizing radiation has enough energy to ionize your DNA or surrounding chemicals, so it can lead to problems like cancer - DNA reproduces uncontrolled. But you need potassium to live, so eat bananas. Sun in moderation is healthy but sunbathing is bad.

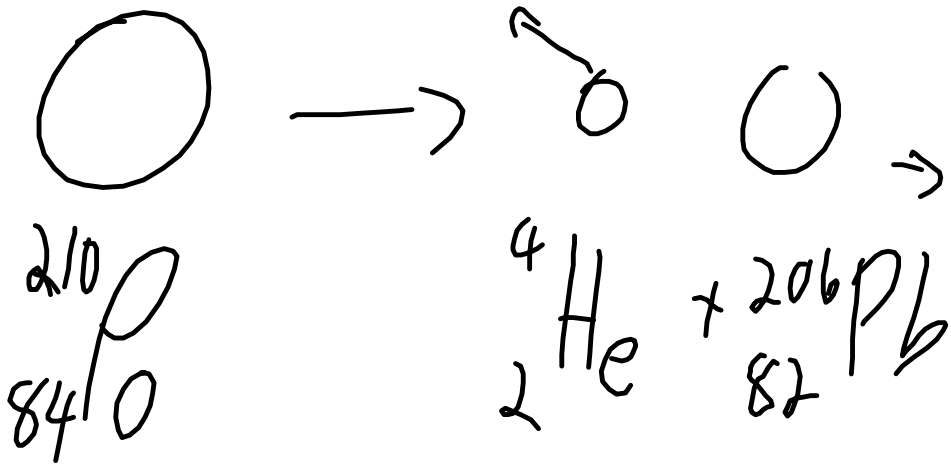
Most radiation is created by electrons jumping energy states.

nuclear radiation is created by isotopes that are unstable.

3 common types of nuclear radiation.

alpha, α, beta, β and gamma, γ

alpha decay happens in large unstable nucleii, it is when a helium 4 nucleus is emitted from the nucleus.
eg. Polonium 210 decays by alpha decay



alpha decay has low penetration, stopped by a piece of paper or your skin.

Beta decay has more penetration, stopped by your hand or thin lead.
Beta negative - an electron is created in the nucleus and emitted at high energy along with a anti-matter neutrino (hard to detect)
anti-matter annihilates when it contacts the right kind of matter.
Potassium 40 decays by beta negative:

$^{40}_{19}K \rightarrow {}^{0}_{-1}e + {}^{0}_{0}\bar{\nu} + {}^{40}_{20}Ca$

electron anti-neutrino

$^{12}_{6}C \rightarrow {}^{0}_{+1}e + {}^{0}_{0}\nu + {}^{12}_{5}B$

Positron neutrino

- anti-matter electron

Gamma - deep penetration - through lead

$^{238}_{92}U \rightarrow {}^{0}_{0}\gamma + {}^{238}_{92}U$

p621 Q5-8